

From "Brian N. Popp" <popp@hawaii.edu>
Sent Monday, October 11, 2010 6:47 am
To hihwmanagementplan@noaa.gov
Subject Comments on HIHWNMS management plan review

Dear Management Plan Review Coordinator,

Articles in the Summer 2010 edition of the Kohol Connection state that the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) is soliciting comments for their management plan review, and that they are considering expanding their scope to include species in addition to humpback whales. I am writing to bring to your attention a series of coral reefs, within HIHWNMS waters in the Auau Channel, that may be particularly good candidates for inclusion within the Sanctuary.

Well developed scleractinian (stony) coral reefs have long been thought to be limited to waters shallower than approximately 30 to 40 m (100 to 130 ft) due to the coral's symbiotic relationship with zooxanthellae that live within the coral's tissue. They fix carbon through photosynthesis and provide some of that photosynthate as nutrients to their coral host. As with any photosynthetic organism, zooxanthellae require light to fix inorganic carbon and light levels diminish with increasing depth. The depth limit of coral reefs of ~40 m depth coincides with the maximum depth of conventional no-decompression scuba diving and little effort has historically been made to explore for reefs in deeper areas. However, over the last decade or so, in Hawaii and elsewhere, efforts to map the seafloor or manage other resources have revealed the presence of dense aggregations of scleractinian corals at depths well below 30 m. Such communities, are now referred to as mesophotic coral ecosystems (MCEs) and are characterized by the presence of light-dependent coral and associated algal and sponge communities that are typically found at depths starting at 30 to 40 m and extending to over 150 m in tropical and subtropical regions." For the last decade, systematic efforts have been made to map coral reef ecosystems across the islands, atolls, and banks in the Hawaiian and Mariana Archipelagos, the islands of American Samoa and the Pacific Remote Islands Area. Analysis of more than 650 kilometers of seafloor imagery from these efforts has documented the presence of previously unknown MCE reefs within all of these island groups, but also shown that MCE reefs are relatively rare compared to shallow coral reefs.

In 2004, biologists with the Hawaii Division of Aquatic Resources discovered extensive beds of large coral colonies covering nearly 100% of the seafloor at depths of approximately 75 m in the Auau Channel within the HIHWNMS. That discovery eventually led to a \$1.8 million grant from the NOAA Center for Coastal and Ocean Studies for a 3-year, multi-agency study of MCE reefs in the Auau Channel, which includes the DAR, University of Hawaii, Bishop Museum, and others. Our research is revealing that the Auau Channel hosts a spectacular complex of MCE reefs. We are also finding that many reef fishes may use mesophotic coral ecosystems as refugia. Collectively the MCE in the Auau Channel feature numerous large coral colonies and aggregations of mesophotic corals and reef fishes that are more dense and extensive than those from any other islands where the above-described coral reef mapping occurred. Most of the mesophotic zone in the Hawaiian Islands and elsewhere around U.S.-affiliated Pacific Islands remains only lightly explored. However, given the data currently available, it is likely that the MCE reefs in the Auau Channel will remain the

best-developed complex to be found in Hawaii, and one of, if not the, best amongst these other island groups.

As more is being learned about the Auau Channel's mesophotic reefs, threats or potential threats to them are becoming more apparent as well. Power cables from alternative energy projects, communications cables, and disposal sites for shipwrecked vessels and dredge material are a few of the potential sources of direct physical damage to mesophotic reefs. Invasive species and diseases are other potential threats whose impacts to the often mono-specific stands of mesophotic corals may be exacerbated by global climate change. Preliminary evidence suggests that growth rates of shallow water corals are several times faster than those of their mesophotic counterparts, likely making mesophotic reefs particularly vulnerable to the corrosive effects of an increasingly acidic ocean.

The mesophotic reef complex within the HIIHWNMS in the vicinity of the Auau Channel is both spectacular and unique. Yet it is also vulnerable to a suite of threats, some of which are growing. I wanted to take this opportunity to bring these little-known reefs to your attention, in case these characteristics might make the mesophotic coral ecosystems in the HIIHWNMS good candidates for inclusion in Sanctuary's Management Plan that is currently under review. Please do not hesitate to contact me if you have questions or would like further information.

Aloha,

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